

# CLAIMS

1. A vector system comprising at least one DNA vector, the vector or vectors containing a target-cleaving hammerhead ribozymal DNA sequence under control of a promoter effective in human cells and which, upon transcription to RNA will cleave the mRNA transcribed from a target gene encoding the CCR5 or CXCR4 protein.

2. A vector system according to Claim 1, containing target-cleaving ribozymal sequences for cleaving mRNA transcribed from both the CCR5 and CXCR4 target genes.

3. A vector system according to Claim 1 or 2, comprising at least two DNA vectors, wherein a first vector contains a first promoter effective in human cells, operably linked to a gene which is expressible to produce an activator protein capable of acting on a second promoter, and a second vector contains the second promoter operably linked to a target-cleaving hammerhead ribozymal DNA sequence for cleaving mRNA transcribed from the CCR5 target gene, the CXCR4 target gene or both the CCR5 and CXCR4 target genes.

4. A vector system according to Claim 3, comprising at least 3 DNA vectors, wherein the second vector contains target-cleaving ribozymal DNA for cleaving mRNA transcribed from the CCR5 target gene and wherein the third vector contains target-cleaving ribozymal DNA for cleaving mRNA transcribed from the CXCR4 target gene.

5. A vector system according to Claim 3 or 4, wherein the second promoter is a T7 polymerase promoter and the activator protein is a T7 polymerase.

6. A vector system according to Claim 5, wherein the promoter further comprises DNA providing an internal ribosome entry site (IRES) for assisting the translation of the T7 polymerase gene in human cells.

7. A vector system according to any preceding claim wherein the ribozymal DNA sequence further comprises, downstream of the target-cleaving ribozymal sequence, a 3'-autocatalytic hammerhead ribozymal DNA sequence, so that when the ribozymal DNA is transcribed to RNA, it has a representable form as a double hammerhead, having first and second stems of a target-cleaving ribozyme which targets CCR5 or CXCR4 mRNA and first and second stems of 3'-autocatalytic ribozyme.

8. A vector system according to any preceding Claim, wherein the first and second structure-stabilising stem loops are positioned one to each side of the first recognition sequence.

9. A vector system according to Claim 8, wherein a second recognition sequence is positioned downstream of the second structure-stabilising stem loop.

10. A vector system according to Claim 9, wherein the target-cleaving ribozyme sequence comprises in order (5' to 3'):

a first structure-stabilising stem loop;

a first target-recognition sequence;

a first catalytic sequence;

a second structure-stabilising stem loop;

a second catalytic sequence; and

a second target-recognition sequence.

11. A vector system according to any preceding claim wherein the target-cleaving ribozymal DNA sequence, when transcribed to RNA, will cleave a target RNA sequence present in CCR5 or CXCR4 RNA, and which contains a first recognition sequence (5' to 3'):

tagattg or ctctact, respectively for CCR5 and CXCR4

and downstream thereof a second recognition sequence

acttg or acgttgt, respectively for CCR5 and CXCR4.

12. A pharmaceutically acceptable carrier containing a vector system defined in any one of Claims 1-11.

13. A carrier according to Claim 12 in the form of liposomes.

14. A pharmaceutical composition comprising liposomes as claimed in Claim 13 and a diluent or carrier.

15. A vector system according to any one of Claims 1-11, for the preparation of a formulation for use in the therapy of a disease associated with HIV infection.

16. Use of a vector system according to any one of Claims 1-11, for use in therapy of a disease associated with HIV infection.

17. Ribozymal DNA comprising (i) a target-cleaving hammerhead ribozymal DNA sequence under control of a promoter effective in human cells and which, upon transcription to RNA will cleave the mRNA transcribed from a target gene encoding the

5 CCR5 or CXCR4 protein, and downstream thereof (2) a 3'-autocatalytic hammerhead ribozymal DNA sequence, so that when the ribozymal DNA is transcribed to RNA, it has a form represented as a double hammerhead, having first and second stems of a target-cleaving ribozyme which targets CCR5 or CXCR4 mRNA and first and second stems of 3'-autocatalytic ribozyme, together with a common third system joining the two hammerheads.

18. Ribozymal DNA which, when transcribed to RNA, will cleave a target RNA sequence present in CCR5 or CXCR4 RNA and which contains a first recognition sequence (5' to 3'):

10 tagattg or ctcaact, respectively for CCR5 and CXCR4  
and downstream thereof a second recognition sequence

acttg or acgttgt, respectively, for CCR5 and CXCR4.

19. Ribozymal DNA according to Claim 18, comprising tandem CCR5 RNA- and CXCR4 RNA- cleaving sequences.